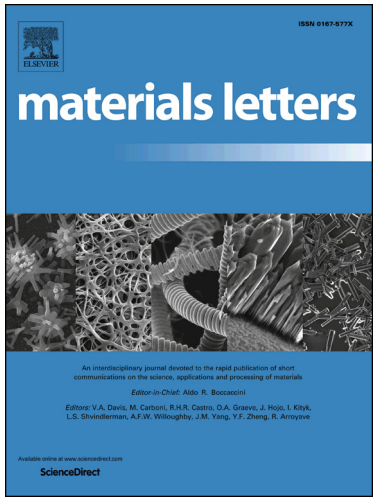

Fiber Membrane with Orthogonal Aligned Surface for Guided Tissue Regeneration

Yao Ge, Rui-peng Chen, Hong Li, Zhen-zhao Guo

PII: S0167-577X(18)30939-X
DOI: https://doi.org/10.1016/j.matlet.2018.06.034
Reference: MLBLUE 24474

To appear in: *Materials Letters*

Received Date: 13 March 2018
Revised Date: 18 May 2018
Accepted Date: 11 June 2018

Please cite this article as: Y. Ge, R-p. Chen, H. Li, Z-z. Guo, Fiber Membrane with Orthogonal Aligned Surface for Guided Tissue Regeneration, *Materials Letters* (2018), doi: https://doi.org/10.1016/j.matlet.2018.06.034

Fiber Membrane with Orthogonal Aligned Surface for Guided Tissue Regeneration

Yao Ge[a], Rui-peng Chen[a], Hong Li[a, *], Zhen-zhao Guo[a, b, *]

[a] *Department of Materials Science and Engineering, Jinan University, Guangzhou 510632, China*

[b] *The First Affiliated Hospital of Jinan University, Guangzhou 510630, China*

Abstract

A novel guided tissue regeneration (GTR) membrane with orthogonal aligned fibers in surface layers and random fibers within interlayer was developed by multilayer electrospinning. The mechanical strength of tri-layer membrane was between random and aligned membranes. The promotion of the proliferations of MC3T3-E1 and NIH-3T3 cells on the tri-layer membrane were observed during monoculture. When cells were cocultured, the tri-layer membrane was effective in impeding MC3T3-E1 and NIH-3T3 cell infiltration by guiding cells to grow along the direction of the fiber alignment.

Keywords: Fiber technology; Multilayer structure; Guided tissue regeneration; Electrospinning

1. Introduction

The regeneration of periodontal tissues loss as a consequence of destructive periodontal disease remains a challenge for clinicians [1]. Use of a guided tissue regeneration (GTR) membrane has emerged as the most widely practical regeneration procedure. Fibrous membranes fabricated by electrospinning for GTR should be biologically active, spatially designed and mechanically adapted that closely mimic the dimension and spatial arrangement of collagen fibrils in natural tissue matrix